Moringa oleifera (MO) tree parts are rich in various nutrients and bioactive compounds. Leaves, stems, flowers, pods, and seeds contain high levels of glucosinolates (glucomoringin being most prevalent in the stem, leaves, flowers, pods, and seeds, while glucotropaeolin dominates in roots), flavonoids (quercetin, kaempferol, isorhamnetin), carotenoids (all-E-lutein being the major carotenoid), tocopherols (α-tocopherol), polyunsaturated fatty acids (PUFAs, particularly α-linolenic and linoleic acid in leaves), bioavailable minerals (potassium, calcium, magnesium, and iron), and folate (various forms, with high bioavailability). Glucosinolates' enzymatic breakdown yields compounds with hypotensive and spasmolytic effects. Indian MO varieties (PKM-1 and PKM-2) show higher quercetin and kaempferol levels than African ones. Pakistan's 'Pakistan Black' and 'Techiman' cultivars demonstrate superior polyphenolic and antioxidant properties. MO's folate is highly bioavailable, crucial for preventing deficiencies and related diseases. Leaves have the highest carotenoid concentration, with Bhagya (KDM-1) cultivar showing the most all-E-zeaxanthin and all-E-β-carotene. Tocopherols are susceptible to degradation during processing, prompting research into enhancing their levels through biotic elicitors. MO seeds are rich in oleic acid and have a fatty acid profile similar to olive oil, but hexane extraction is preferred for human consumption. MO leaves are a good source of protein and minerals, with Moringa leaf iron demonstrating superior bioavailability compared to ferric citrate. Defatted MO kernels show improved protein content and functional properties. While MO fortification enhances staple food nutrition, .further research on nutrient bioavailability in MO-fortified foods is needed